

Application No. 09/524,227
Docket No. 13DV-13004
Amendment dated February 21, 2005
Reply to Office Action of October 22, 2004

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or more of U.S. Patent Nos. 4,514,469 to Loersch et al. (Loersch), 4,512,817 to Duhl et al. (Duhl), 6,042,898 to Burns et al. (Burns), and 6,365,236 to Maloney. The combination of the AAPA and Nakamura is essential to each of the §103 rejections. As in previous Office Actions, the rejections were generally set forth as follows: the Examiner cited the AAPA as disclosing a thermal barrier coating system (20) comprising an aluminide bond coat (24) characterized by substantially columnar grains (32) and grain boundaries (34) exposed at the bond coat surface, acknowledged that the AAPA does not teach recrystallizing at least a surface region of the bond coat (24) during or prior to depositing a thermal barrier coating (26) on the bond coat (24) so that new grains (42,48,50) form at the bond coat surface, but then cited Nakamura for teaching

after depositing a diffusion coating layer of Al (i.e., an aluminide bond coat) on the surface of a gas turbine component such as a blade (i.e., a process analogous to that taught by the AAPA), the diffusion coating layer is shot-peened and then heated to a temperature at or above the recrystallization temperature of the coating layer, thereby causing recrystallized grains (i.e., "new grains") to form on the surface of the diffusion coating layer (Abstract).

from which the Examiner concluded that it would have been obvious to a person having ordinary skill in the art at the time the invention was made

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to improve the thermal fatigue life of the TBC system of the AAPA . . . as taught by Nakamura et al., with the reasonable expectation of successfully and advantageously providing the coated superalloy component/blade of the AAPA with [benefits].

In response to arguments that accompanied Applicant's RCE, the Examiner provided a detailed explanation for his maintaining the rejections in the "Response to Arguments" section of the Office Action. In particular, the Examiner presented reasons why he believed those of ordinary skill in the art would find Nakamura to be relevant to Applicant's claimed invention.

In response, Applicant submits herewith a Rule 132 declaration, in which she provides direct responses to the reasons given by the Examiner for maintaining the rejections. Briefly, Applicant Irene Spitsberg explains:

(1) the differences between the failure mechanism that Nakamura attempts to address by peening and the failure mechanism that Applicant and others in the TBC art must address if attempting to solve the problem of TBC spallation, and provides amply proof to rebut the Examiner's conclusion that previous arguments made by Applicant concerning this issue were merely based on "speculation"; and

(2) why those of ordinary skill in the art do not and would not view the "peeling-off, thermal fatigue, cracking and crack propagation, etc." in a diffusion coating that was addressed by Nakamura is in any way related to TBC

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spallation in diffusion aluminide bond coat-based TBC systems such as the AAPA.

Applicant believes that her declaration establishes that she is an expert in the relevant art, particularly in regard to the spallation mechanisms of TBC systems, and is therefore qualified to provide opinions as to the conventional wisdom in the art, including what those skilled in the art believe and what those skilled in the art would conclude from the teachings of Nakamura. On reviewing Applicant Spitsberg's testimony in her Rule 132 Declaration, it can be appreciated that while the Examiner's opinion is that it would have been obvious to a person having ordinary skill in the art to modify the TBC system of the AAPA according to the teachings of Nakamura with a reasonable expectation of success, Applicant's expert opinion is that, without the benefit of her teachings:

- one of ordinary skill in the art would not be motivated to try the proposed modification because the failure mechanism addressed by Nakamura is unrelated to the failure mechanism associated with TBC spallation and addressed by Applicant's invention; and
- one of ordinary skill in the art would not have any reasonable expectation that peening the surface of a diffusion aluminide bond coat would improve the thermal fatigue life of a thermal barrier coating deposited on the

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bond coat.

Finally, the lack of a reasonable expectation of success is evident from the applied prior art itself, specifically the AAPA's express teachings that

TBC spallation initiates by a different mechanism on diffusion aluminide bond coats, and primarily along the alumina-bond coat interface. Accordingly, the toughness of the alumina and the alumina-bond coat interface are most important to TBC deposited on a diffusion aluminide bond coat. From this perspective, *polishing a diffusion aluminide bond coat would be expected to reduce TBC life, since sufficient surface roughness of the bond coat would be desired to promote adhesion of the alumina to the bond coat, and to inhibit crack propagation through the alumina and alumina-bond coat interface. As a result, conventional practice has been to grit blast the surface of a diffusion aluminide bond coat to increase its roughness to about 50 microinches (about 1.25 micrometers) Ra or more before depositing the TBC. (Emphasis added.)*

Nothing in Nakamura refutes that this is the conventional wisdom in the art of TBC systems. Therefore, the AAPA and Nakamura are not properly combinable as prior art references under 35 USC §103 because the AAPA teaches away from any treatment (such as Nakamura's) that would result in smoothing and flattening a diffusion aluminide bond coat. *In re Lintner*, 173 USPQ 560, 562 (CCPA 1972); *In re Regel*, 188 USPQ 136 (CCPA 1972); *In re Jansson*, 203 USPQ 976 (CCPA 1979).

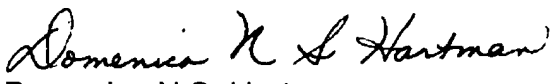
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In view of the above, Applicant respectfully requests withdrawal of all rejections to the claims under 35 USC §103(a), since Loersch, Duhl, Burns and Maloney do not supplement the teachings of the AAPA and Nakamura in order to arrive at Applicant's invention.

Closing

Applicant respectfully requests that her patent application be given favorable reconsideration. Should the Examiner have any questions with respect to any matter now of record, Applicant's representative may be reached at (219) 462-4999.

Respectfully submitted,

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Attachment: Rule 132 Declaration and Exhibits